CODIP

Technology at Work

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Overview
Key Ideas

The CODIP program provides frameworks and components for intelligent processing of information based on its semantics.

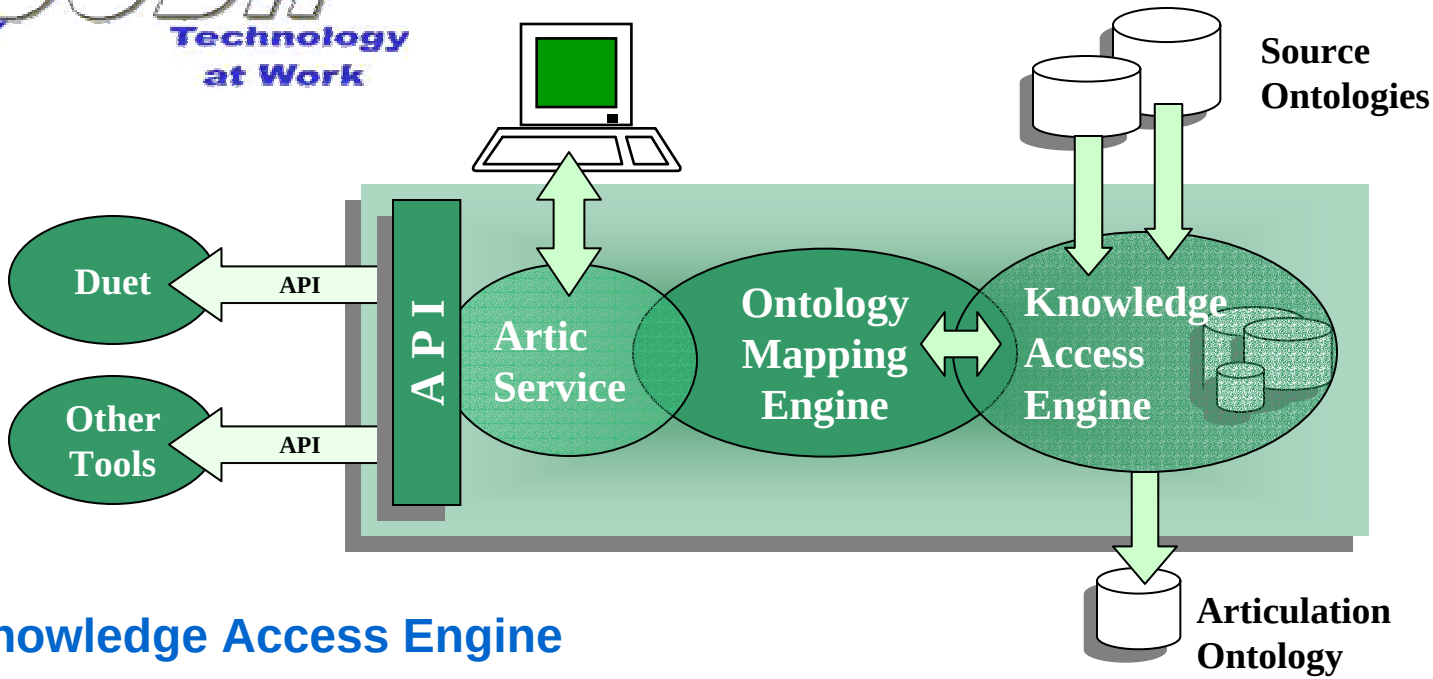
- **Distribution of information from publishers to subscribers using subscriber defined semantic queries.**
- **Automatic generation of semantic mapping between ontologies to facilitate database integration, content translation and distribution.**
- **Application of a UML technology to leverage existing resources to provide knowledge engineering capability.**
- **Ontological processing components and services that can bring built-in knowledge processing capability to applications.**

Overview
Applications and Products

- **Primary products support these applications:**
  - **Duet** to support visualization, application and management of ontologies using the UML/MOF engineering standards,
  - **Kage** to support applications with analysis, translation, and repository functionality,
  - **ODKD** for semantics based publication of information to subscribers, and
  - **Artic** to support using multiple ontologies concurrently by finding and codifying relationships between their concepts.
- **These products are built from library of reusable components that may be integrated into other applications.**

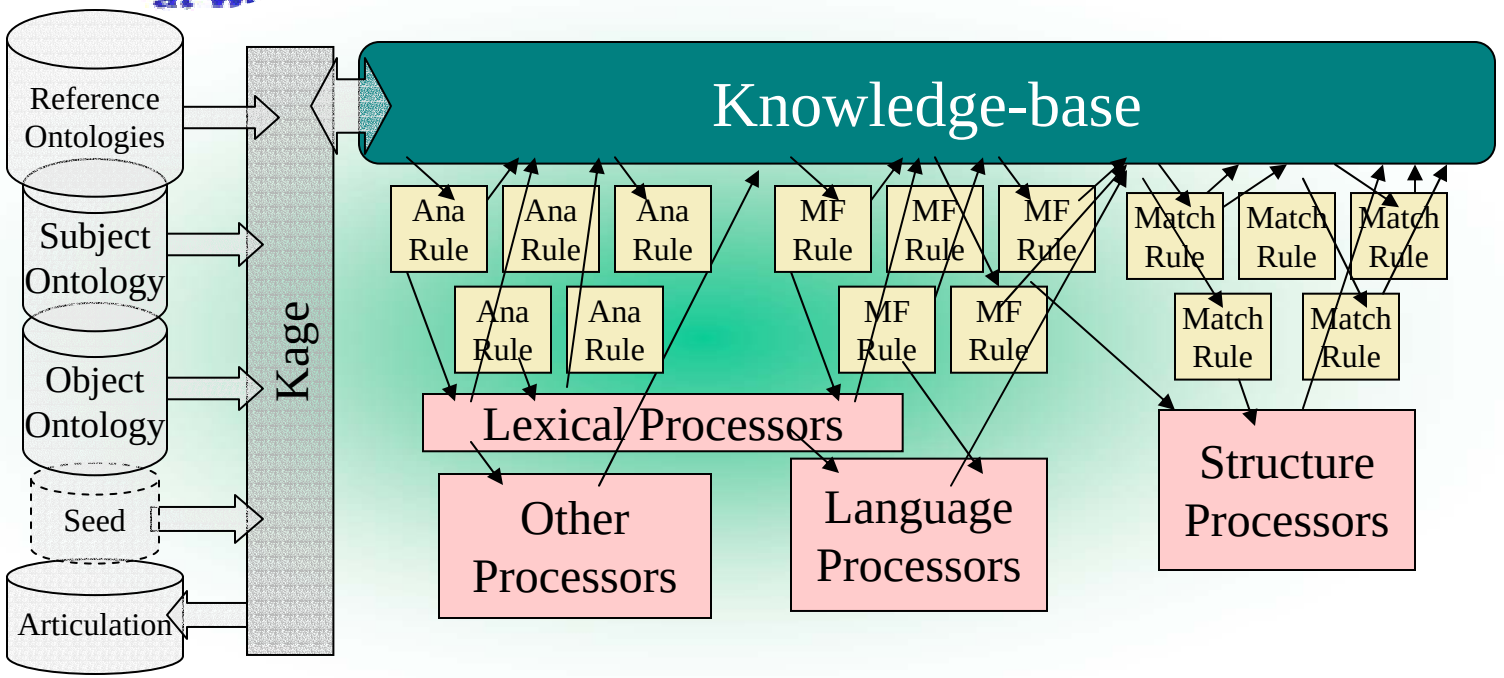
http://codip.grci.com

Artic Functional Architecture



- **Knowledge Access Engine**
  - Provides management and access to collections of ontologies.
- **Ontology Mapping Engine**
  - Provides automated analysis of potential mappings between ontologies and builds articulation ontologies that codify the mappings.
- **Artic Service**
  - Provides APIs, command line and web based access to the mapping engine.

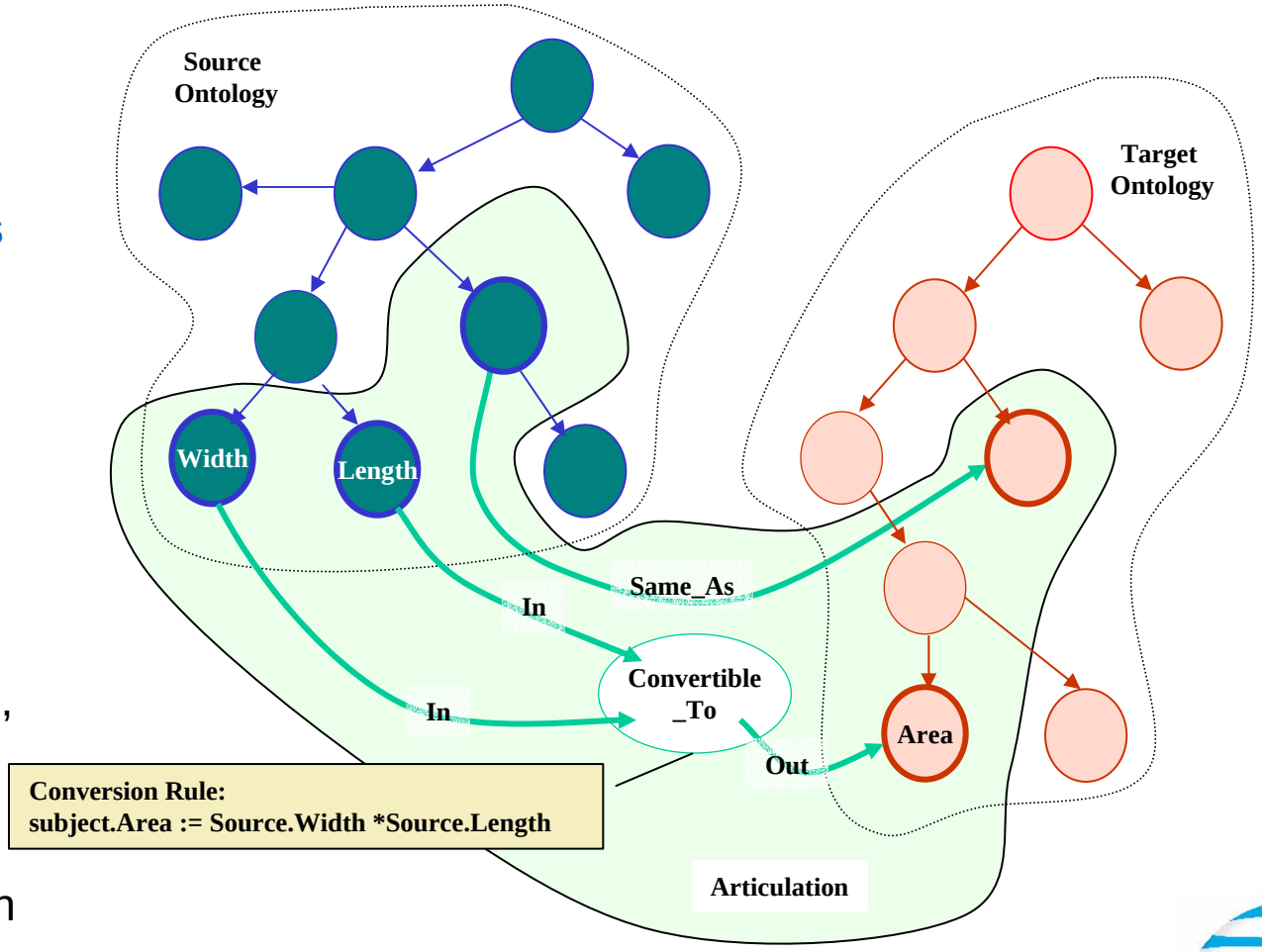
Artic Ontology Mapping Engine



- **Multiple Layers**
  - Non-procedural rules and procedural processors, invoked by rules.
- **Multiple Phases**
  - Analysis, Match Factors, Matches.

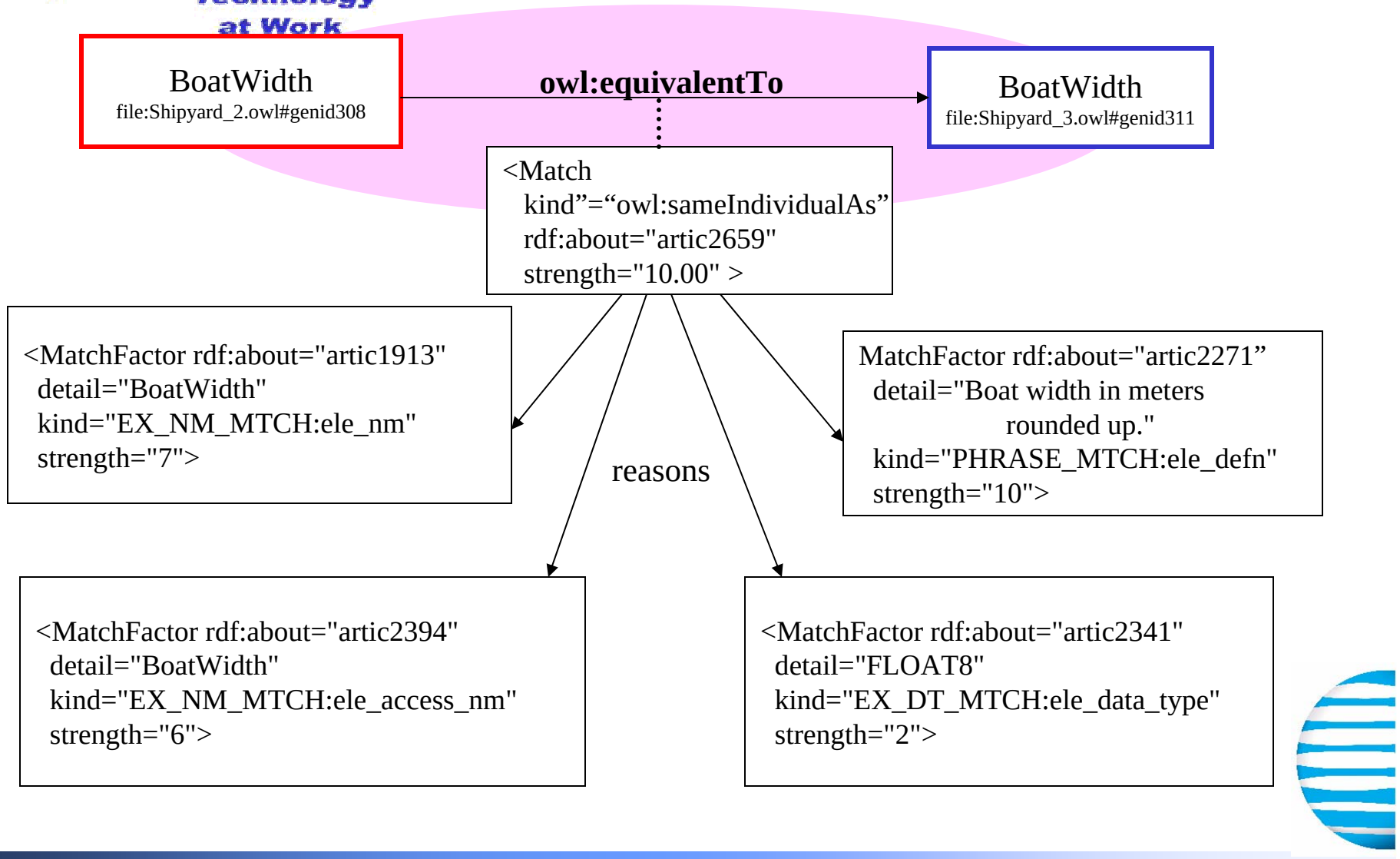
Articulation Ontologies

- **Articulations are specialized ontologies that relate concepts in other ontologies.**
  - Relationships of various types:
    - » Similarity, Part-Of, Kind-Of, Temporal, Spatial, and Domain Specific.
  - Multiplicity may be 1:1, 1:M, M:1 or M:M
  - Variable 'strength'.
  - May include conversion rules, which may be one-way.



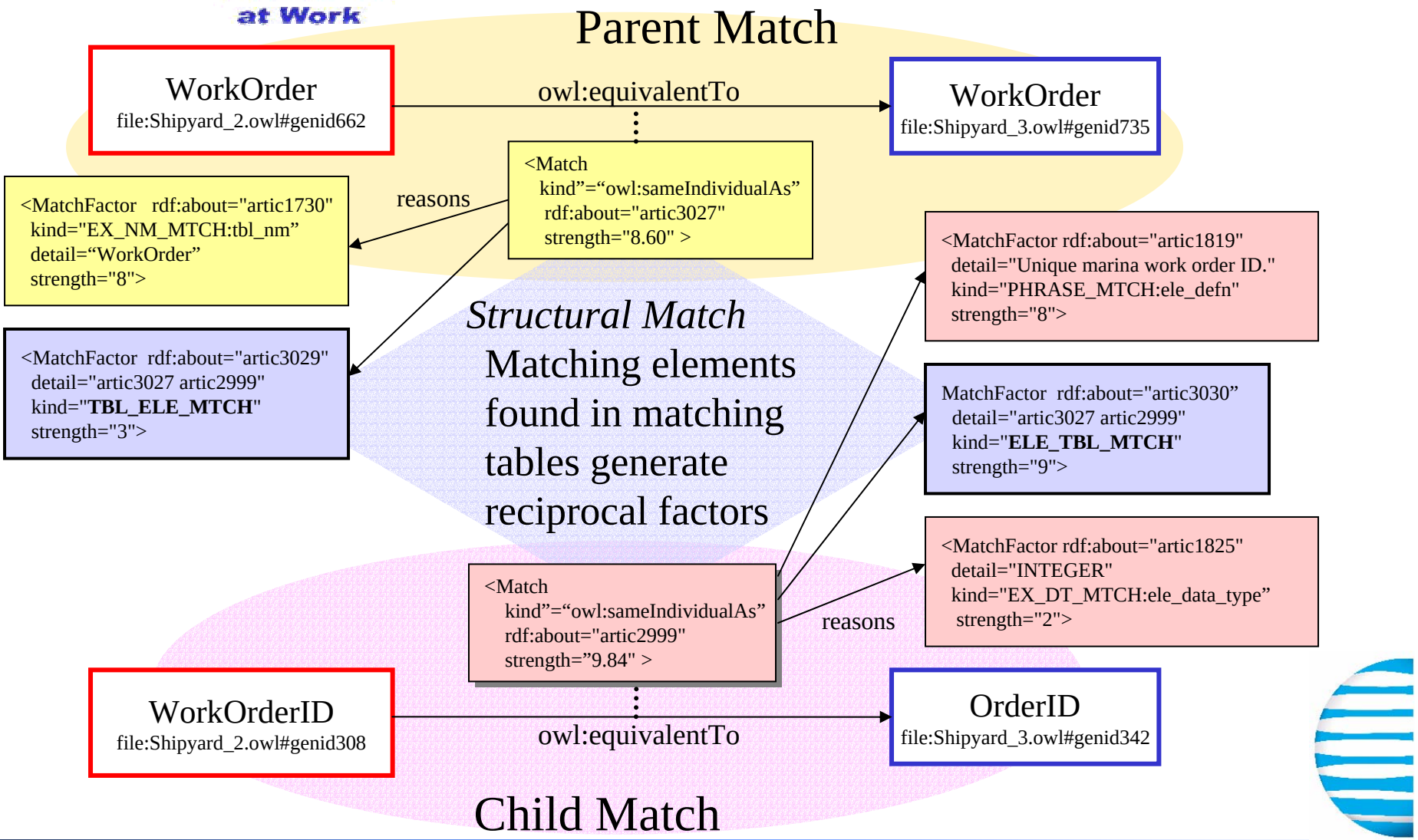
Example Match

Simple, 'Perfect'

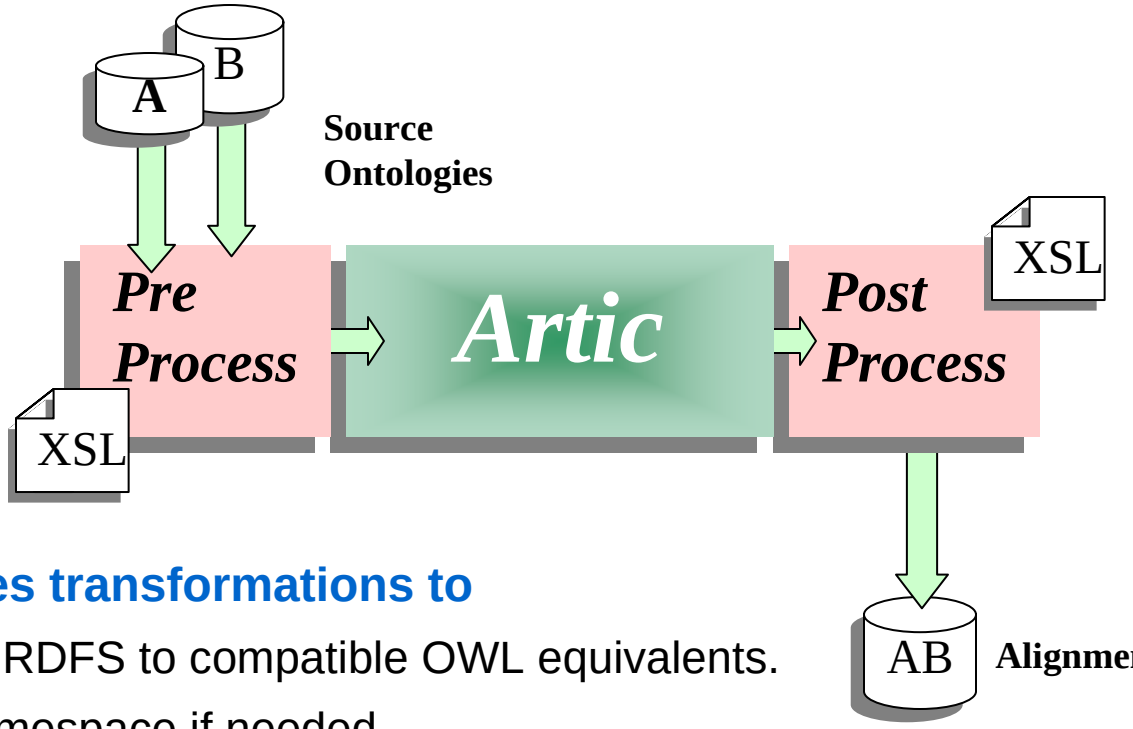


Articulation Example

Structural, Imperfect Match



I3Con Processing



- **Pre Processing applies transformations to**
  - Convert DAML and RDFS to compatible OWL equivalents.
  - Adds XML Base namespace if needed.
- **Post Processing applies transformations to**
  - Convert Articulation to Alignment format.
  - Remove low confidence (< 0.8) and uninteresting matches (e.g. ‘genid’).
  - Removes faulty matches (e.g. rdf:ID=“ “)

I3Con Results Summary

	Animals	Sports	Comsci	Hotel	Network	P&P	P&P-noi	Russia
Alignments	83	187	0	15	44	128	286	150
Confidence								
Maximum	1.0006	0.9671	0.0000	0.9396	1.0011	1.0012	0.9824	0.9997
Minimum*	0.8423	0.8423	0.0000	0.8435	0.8423	0.8423	0.8423	0.8423
Average	0.9283	0.9223	N/A	0.8808	0.9051	0.9111	0.9255	0.9024
Median	0.9326	0.9384	N/A	0.8709	0.9374	0.9374	0.9358	0.9359

* Confidence < 0.8 removed.

- **Issues**
  - Namespaces – XML Base needed to allow local file usage.
  - ID verses rdf:ID – leads to resources with no ID.
- **Semantic differences between RDF/S, DAML+OIL, OWL**
- **Some results not understood**
  - Comsci topic lead to no alignments
  - Removal of instance data in People&Pets produced more alignments.